

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C.20231
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 16 October 2000 (16.10.00)	
International application No. PCT/IT00/00053	Applicant's or agent's file reference 7404/100
International filing date (day/month/year) 18 February 2000 (18.02.00)	Priority date (day/month/year) 26 February 1999 (26.02.99)
Applicant CAZZOLARO, Sergio	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

13 September 2000 (13.09.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF RECEIPT OF
RECORD COPY

(PCT Rule 24.2(a))

From the INTERNATIONAL BUREAU

T :

CIONI, Carlo
Studio Cioni & Pipparelli
Viale Caldara, 38
I-20122 Milano
ITALIE

Date of mailing (day/month/year) 11 April 2000 (11.04.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 7404/100	International application No. PCT/IT00/00053

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

CAZZOLARO, Sergio (all designated States)

International filing date : 18 February 2000 (18.02.00)

Priority date(s) claimed : 26 February 1999 (26.02.99)

Date of receipt of the record copy
by the International Bureau : 27 March 2000 (27.03.00)

List of designated Offices :

AP : GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

National : AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO,
NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

☒ time limits for entry into the national phase

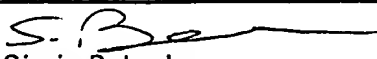
☒ confirmation of precautionary designations

☒ requirements regarding priority documents

EXPRESS MAIL NO. EL 815472 581 US

MAILED 22 AUGUST 2001

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer:  Simin Baharlou Telephone No. (41-22) 338.83.38
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PATENT COOPERATION TREATY

WO 00/50702
PCT/IT00/00053

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

CIONI, Carlo
Studio Cioni & Pipparelli
Viale Caldara, 38
I-20122 Milano
ITALIE

RECEIVED

08 SET. 2000

STUDIO CIONI & PIPPARRELLI

Date of mailing (day/month/year) 31 August 2000 (31.08.00)		
Applicant's or agent's file reference 7404/100		IMPORTANT NOTICE
International application No. PCT/IT00/00053	International filing date (day/month/year) 18 February 2000 (18.02.00)	Priority date (day/month/year) 26 February 1999 (26.02.99)
Applicant CAZZOLARO, Sergio		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CU,CZ,DE,DK,EA,EE,EP,ES,FI,GB,GD,GE,GH,GM,
HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,
PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
31 August 2000 (31.08.00) under No. WO 00/50702

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

EXPRESS MAIL NO. EL 81547258145

MAILED 22 August 2001

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 26 APR 2001

WIPO ECI



Applicant's or agent's file reference 7404/585	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IT00/00053	International filing date (day/month/year) 18/02/2000	Priority date (day/month/year) 26/02/1999
International Patent Classification (IPC) or national classification and IPC E04B1/344		
Applicant CAZZOLARO, Sergio		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 13/09/2000	Date of completion of this report 23.04.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Rosborough, J Telephone No. +49 89 2399 2818 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IT00/00053

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-6 as originally filed

Claims, No.:

1-9 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IT00/00053

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-9
	No: Claims
Inventive step (IS)	Yes: Claims 1-9
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-9
	No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: ER-A-0 884 425.

D2: US-A-5,123,550.

5.1 Independent Claim 1.

Document D1, which is considered to represent the most relevant state of the art, discloses (cf. especially figs. 1 and 3) the combination of features of the preamble of claim 1, from which the subject-matter of claim 1 differs in that (cf. especially fig.5 of the application documents):

- the universal joints have grooves (6) along the sides of the face on which the four seats (2,2',2>> and 2'>>) are provided, close to the edge and parallel to the same edge, which cooperate with C-sectioned fixing elements (9) to hold united two matching universal joints from the two structures to be coupled.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention may therefore be regarded as:

- to provide a system of fixing two or more structures such as are defined by the preamble of claim 1.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT), as none of the available prior-art documents discloses or provides indication for a joining system according to the characterising portion of claim 1.

D1 discloses (cf. fig.2) joining the universal joints by means of screw-connecting telescopic elements (3b) through coinciding holes in said joints.

D2 does not disclose:

- universal joints delimited by large, equal and parallel faces

- four seats corresponding to the side faces of said joint
- the joints having grooves along the sides of the face on which the four seats are provided.

Moreover the C-shaped fixing elements (D2, fig.1, (14)) disclosed by D2 do not "hold united two matching universal joints from the two structures to be coupled" as is required by the content of lines 9 and 10 of claim 1. The two structures held united by said element (14) according to D2 are not "structures of the type which present pairs of scissors-connected tubular elements" as required by lines 2 and 3 of claim 1, rather the two structures held united by said element (14) according to D2 are four-sided structures formed by tubular elements joined substantially end-to-end by way of corner joint links (5-12).

5.2 Independent Claim 8.

Independent claim 8 is directed to universal joints essentially as defined in claim 1 as being comprised in the composite structure according to that claim.

The characterising portion of claim 8 is analogue that of claim 1, so that for the reasons provided under item 5.1, the subject-matter of claim 8 also conforms to the requirements of Articles 33(2) and (3) PCT.

5.3 Dependent Claims 2-7 and 9.

Claims 2-7 and 9 are dependent on claims 1 and 8 respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

7.1 Reference Signs.

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

7.2 Inconsistency.

According to the requirements of Rule 10.2 PCT, the terminology and the signs shall be consistent throughout the application. This requirement is not met in view of the use of the following expressions:

- "tubular extended element (5)" (eg. page 5, line 11) ; "telescopic extension elements (5)" (eg. page 6, lines 8,9) ; and "extendible telescopic tubular element" (claim 2).
- "spring (9)" (description) ; and "C-sectioned fixing elements (9)" (claims).
- "tubular elements" (claim 1, line 3) ; and "extended elements" (claim 2, lines 13-14).
- "the four grooves (2,2',2>> and 2'>>)" (eg. page 5, lines 7 and 10) ; and "seats" (claims).

Re Item VIII

Certain observations on the international application

8.1 Clarity, Claim 1.

Claim 1 does not meet the requirements of Article 6 PCT because the feature "the face on which the four seats are provided" (line 8) lacks an antecedent.

8.2 Clarity, Claims 2 and 9.

Claims 2 and 9 do not meet the requirements of Article 6 PCT because it is not clear what is meant by the terms "in the inside surface of the face" (claim 2, lines 12-13), and "internally to the face" (claim 9, lines 18,19) respectively - (substantially centrally located in the face?).

Said terms give the impression that more than one surface is present in the face referred to, whereby a face can have only one surface.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IT00/00053

8.3 Clarity, Claims 3 and 4.

Claims 3 and 4 do not meet the requirements of Article 6 PCT because:

- (i) It is not clear from the expression "Structures joined according to ..." whether the same (ie. "Composite structures according to ..."), or similar, structures are meant.
- (ii) The term "joined" lacks an antecedent (cf. "held united" - claim 1, line 9).

8.4 Clarity, Claim 8.

Claim 8 does not meet the requirements of Article 6 PCT because the feature "the larger faces" (lines 12-13) lacks an antecedent.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 7404/100	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/IT 00/ 00053	International filing date (day/month/year) 18/02/2000	(Earliest) Priority Date (day/month/year) 26/02/1999
Applicant CAZZOLARO, Sergio		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

4

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IT 00/00053

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

- line 2, add "(5)" after "tubular elements".
- line 5, add "(6)" after "present grooves".
- line 7, add "(9)" after "fixing elements".

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 00/00053

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04B1/344 E04H1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04B E04H A47F G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 123 550 A (NODSKOV ET AL.) 23 June 1992 (1992-06-23)	1,3-5,8
A	column 2, line 62 -column 4, line 4; figures	6
A	EP 0 219 201 A (SILK CUT FLOWERS LIMITED) 22 April 1987 (1987-04-22) page 3, line 5 -page 5, line 5; figures 1-4	1,2,8,9
A	EP 0 271 088 A (WICHMAN) 15 June 1988 (1988-06-15) column 3, line 15 -column 5, line 39; figures 1-6	1,8



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

16 May 2000

Date of mailing of the international search report

23/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Clasing, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IT 00/00053

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5123550	A	23-06-1992	DK 158888 A	24-09-1989
			AU 3363189 A	16-10-1989
			WO 8909006 A	05-10-1989
EP 219201	A	22-04-1987	AU 589670 B	19-10-1989
			AU 6150986 A	19-02-1987
			DK 389286 A	17-02-1987
			GB 2181291 A,B	15-04-1987
EP 271088	A	15-06-1988	AT 82607 T	15-12-1992
			AU 656579 B	09-02-1995
			AU 1604192 A	30-07-1992
			AU 624672 B	18-06-1992
			AU 4886390 A	17-05-1990
			AU 8200487 A	16-06-1988
			CA 1307641 A	22-09-1992
			CA 1320327 A	20-07-1993
			DE 3782725 A	24-12-1992
			DE 3782725 T	09-06-1993
			EP 0498469 A	12-08-1992
			US 4986016 A	22-01-1991
			US 5125205 A	30-06-1992

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ :

E04B 1/344, E04H 1/12

A1

(11) International Publication Number:

WO 00/50702

(43) International Publication Date:

31 August 2000 (31.08.00)

(21) International Application Number: PCT/IT00/00053

(22) International Filing Date: 18 February 2000 (18.02.00)

(30) Priority Data:

MI99A000393

26 February 1999 (26.02.99)

IT

(71)(72) Applicant and Inventor: CAZZOLARO, Sergio [IT/IT];
Località Villa Ivana, I-26823 Castiglione d'Adda (IT).(74) Agent: CIONI, Carlo; Studio Cioni & Pipparelli, Viale Caldara,
38, I-20122 Milano (IT).(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR,
BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD,
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP,
KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK,
MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,
SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW,
ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ,
UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD,
RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI
patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR,
NE, SN, TD, TG).

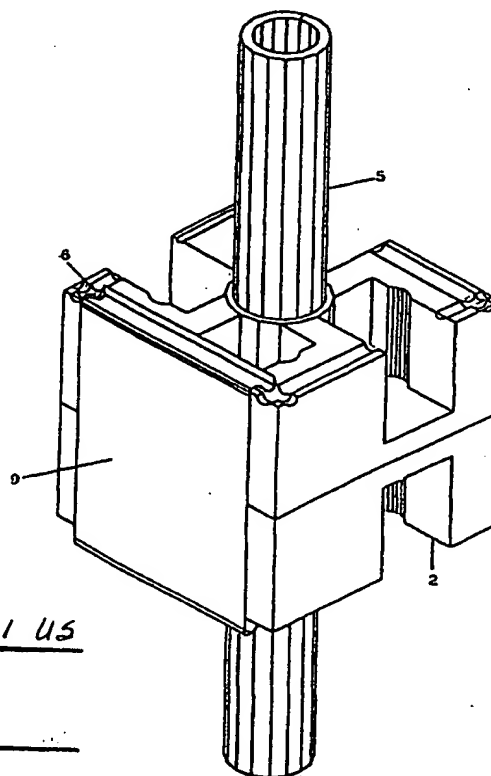
Published

With international search report.

(54) Title: STRUCTURES WHICH CAN BE DISMANTLED AND FOLDED, CONSISTING OF INTERCONNECTING TUBULAR
ELEMENTS

(57) Abstract

Composite structures obtained by joining two or more structures of the type which presents pairs of joined tubular elements (5), whose extremity is hinged in universal joints and in which the universal joints are substantially parallelepiped in form and present four seats of hinging corresponding to the sides faces, in which said universal joints present grooves (6) along the sides of the face, in which are scheduled the seats to hinge the extended elements, in proximity of the edges and parallel to the same edges, that cooperate with C-sectioned fixing elements (9) to hold united two matched universal joints belonging to two structures from join.

EXPRESS MAIL NO. EL 815 472 581 USMAILED 22 AUGUST 2001

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
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CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
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DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

«STRUCTURES WHICH CAN BE DISMANTLED AND FOLDED,
CONSISTING OF INTERCONNECTING TUBULAR ELEMENTS»

5

The present invention relates to folding structures consisting of interconnected extended tubular elements. More particularly, the present invention relates to portable folding structures which can be extended horizontally or vertically, that
10 can be used for product display or as supports for raised loads, such as for instance platforms, walkway bases, technical pavements, rostrums, stands, boxes, comprising a plurality of interconnected parallelepiped cells in which the sides faces of the parallelepiped are defined by a pair of tubular elements interconnected by a scissors-connector. In these structures each extremity of the extended tubular
15 elements which constitute the pair of scissors-connected elements, is inserted by rotation into a seat in an articulated universal joint, also parallelepiped in form. The universal joint presents, on one of the larger faces, a hinging seat corresponding to each side face, and can therefore accept up to four extremities of tubular elements. In the case of structures that must bear heavy loads a variation
20 to the embodiment described above has been used for some time in which the universal joints provide for a fifth seat on the surface of said face into which is fixed a tubular element, within which another tubular element of smaller diameter is inserted as a sliding fit and whose extremity is inserted into the face of a similar universal joint. The tubular element inserted into the face of the universal joint is

fixed and is stopped against the opposed joint into which is inserted the extremity of element that slides inside.

It is often necessary to arrange for exhibition structures or raised support higher than is attainable with the single structure. In this case, more identical (or similar) structures are superimposed such that, in the overlap, the upper faces of the universal joints of the underlying structure are matched to the corresponding lower faces of the upper structure.

Devices are known to increase the height of the exhibition or support systems mentioned above. For instance, an exhibition system that could give rise to structures of different height is described in EP-A-0 419 006.

The structure described in said patent is complex, provides for a plurality of articulated elements and therefore requires long assembly and dismantling times.

The system proposed in the EP-A-0 884 425 provides for uniting the joints of two structures by connecting the extremities of the two telescopic elements, for instance by means of screw or pin systems.

This system also presupposes complex and onerous setting-up operations, as well as relatively long dismantling and assembly times.

One purpose of the present invention is provision of a simple and rapid method of joining two or more structures of the type consisting of pairs of extended tubular shear-connected elements, whose extremity is hinged in universal joints and in which the universal joints are defined integral with equal and parallel larger faces and are preferably substantially parallelepiped in form and present four hinging seats set in one of the larger faces near a side face.

A second purpose of the present invention is the coupling of two or more superimposed structures of the type described above that furthermore present in the inside surface of the face of the universal joint, in which are seats for the hinging of the extended elements, a fifth seat into which is fixed the extremity of
5 an extendible telescopic tubular element whose other extremity is fixed to the opposite underlying universal joint.

And a further purpose of the present invention is a device that allows the coupling of the aforesaid structures.'

The purposes of the present invention are achieved using the universal joints
10 described above that present grooves along the sides of the face, in which are scheduled seats for lodging the extended elements in proximity to the edges of the type and parallel to the same edges, that cooperate with C-sectioned fixing elements to hold two matching universal joints belonging to two superimposed structures together.

15 According to a preferred embodiment of the invention, the C-shaped fixing elements are substantially rectangular sheets of flexible material with two opposite edges folded and inverted, in the following also referred to as the C-shaped spring or C-spring. The folded and inverted edges of the C-shaped spring present dimensions and forms corresponding to those of the grooves cut into the faces of
20 the universal joints.

The C-shaped springs with inverted edges cover most of the corresponding side faces of the superimposed universal joints and they could provide for, in some

cases, grooves in correspondence with seats of lodgement of the extended elements and they could take different configurations depending on their use.

The C-shaped springs could be applied to all the side faces of all the joints that are matched in the overlap or in coupling of multiple structures.

- 5 It has been found, however, that to get sufficient stability in most cases it is sufficient to apply the C-springs only on the external faces of the universal joints that are on the external surface of the structure. The application of the C-springs to only the external faces of the joints enormously simplifies the operation of assembly and dismantling of the coupled structures.
- 10 To further guarantee the stability of the joined structure, the faces of the matching joints could present one or more suitable perforations for the housing pivots that prevent any movement of the joints on the contact pivot.

- The present invention will now be illustrated in more detail making reference to preferred embodiments of the same that are described with the aid of the attached
- 15 drawings. These sketches and the embodiments are by way of example and must not be interpreted as limiting the invention.

In the sketches:

- figure 1 shows a view in perspective of a universal joint according to the invention;
- 20 - figure 2 shows a side view of the C-sectioned spring that could cooperate with the joint of figure 1;
- figure 3 is a view in perspective of the spring of figure 2;

- figure 4 shows a side view of two joints belonging to two superimposed structures fixed together by means of the springs of figures 2 and 3.
- figure 5 is an exploded view of a preferred system of connection of structures according to the invention.
- 5 - figure 6 is a simplified scheme of two superimposed structures coupled according to invention.

With reference to figures 1 to 4, the universal joint 1 presents four grooves 2, 2', 2» and 2'» on one of its larger faces in correspondence to the side face, that could accept hinged extended tubular elements not shown in the figure. On face 3 of the
10 universal joint that presents the four grooves (2, 2', 2» and 2'») there is an opening 4 to fix the extremity of a tubular extended element 5, within which another tubular element slides, not shown in the figure and connected with a corresponding universal joint. Along the edges of said face of the universal joint are grooves 6 which constitute seats to accept one of the extremities 8 of a spring
15 9 as shown in figure 4.

The insertion of the two extremities of the spring 9 into the grooves on the non-matching faces of two joints belonging to two superimposed structures allows the coupling of the structures to be maintained fixed. The insertion of the springs is easily achieved after the structures have been superimposed by snapping the
20 inverted extremities 8 of the springs 9 into said grooves, where they remain locked. The operation of dismantling is performed quickly, for instance, by removing one of the two inverted extremities 8 of the C-springs from the groove.

Figure 5 shows a preferred embodiment of the invention. This provides for the use of universal joints whose face opposite to that in which the grooves have been made contains the opening 10 that can accept pivots 11 that prevent any relative movement of the joints in the horizontal plane.

- 5 Figure 6 shows a side view of a support system for elevated loads according to the invention, obtained by joining two structures.

The said figure shows the extended elements 12 joined with scissors-connection and hinged in seats 2 of the universal joint, as well as the telescopic extension elements 5, that assure resistance to loading of the structure.

CLAIMS

1. Composite structure obtained by coupling two or more structures of the type which present pairs of scissors-connected tubular elements whose extremities are hinged in universal joints and in which the universal joints are integral delimited
5 by large, equal and parallel faces preferably substantially parallelepiped in form and which present four seats corresponding to the side faces to accept hinged elements, characterized by the universal joints having grooves along the sides of the face on which the four seats are provided, close to the edge and parallel to the same edge, which cooperate with C-sectioned fixing elements to hold united two
10 matching universal joints from the two structures to be coupled.
2. Composite Structures according to Claim 1, characterized by the structures joined being superimposed and presenting, besides, in the inside surface of the face of the universal joint in which there are seats for hinging the extended elements, a fifth seat in which is fixed the extremity of an extendible telescopic
15 tubular element whose other extremity is fixed to the opposed joint of the underlying universal joint.
3. Structures joined according to Claims 1 or 2, characterized by the C-shaped fixing elements being substantially rectangular sheets of flexible material with two opposite folded and inverted edges.
- 20 4. Structures joined according to the Claims 1 to 2, characterized by the folded and inverted edges of the C-shaped fixing elements presenting dimension and shape corresponding to the grooves on the faces of the universal joint.

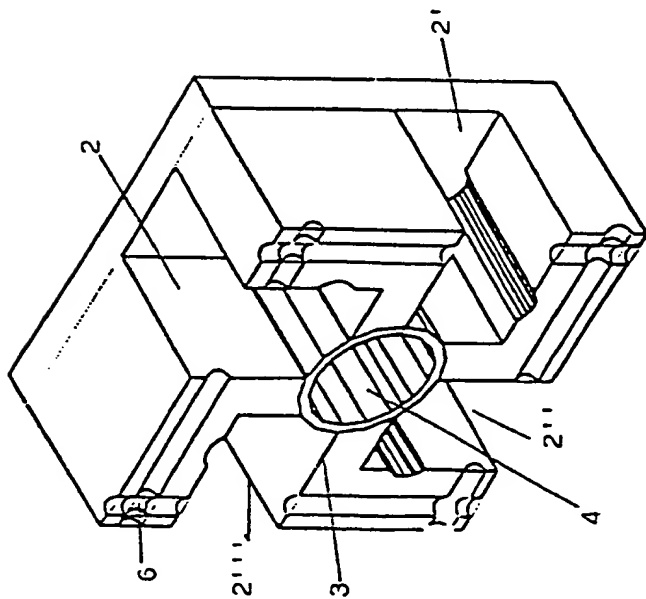
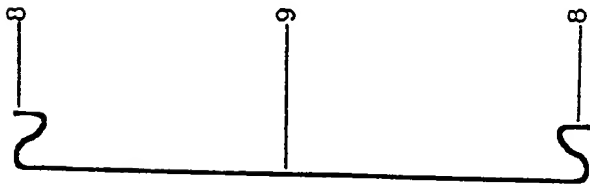
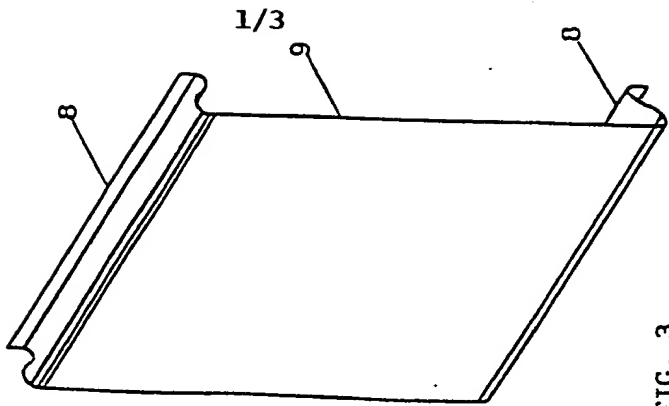
5. Composite structures according to Claims 1 to 4, characterized by the C-shaped fixing elements being applied only on the external faces of the universal joints that are on the external surface of the structure.

6. Composite structures according to Claims 1 to 4, characterized by the C-shaped fixing elements with inverted edges covering most of the corresponding side faces of the superimposed universal joints and providing for cut-outs corresponding to the seats for the hinged extended elements.

7. Composite structures according to Claims 1 to 6, characterized by the matching faces of the joints of the joined structures presenting one or more suitable perforations to house pivots that prevent any movement on the surfaces of contact of the joints.

8. Universal joints of substantially parallelepiped form providing in one of the larger faces for four hinging seats, corresponding to the side faces, for fixing the extremities of extended elements, characterized by presenting grooves along the sides of the face in which are scheduled seats for hinging the extended elements, in proximity of the edges and parallel to the same edges, that could cooperate with C-sectioned fixing elements to unite two matched universal joints.

9. Universal joints according to Claim 8, characterized by presenting internally to the face carrying the grooves, a fifth seat into which is fixed the extremity of an extendible telescopic tubular element.



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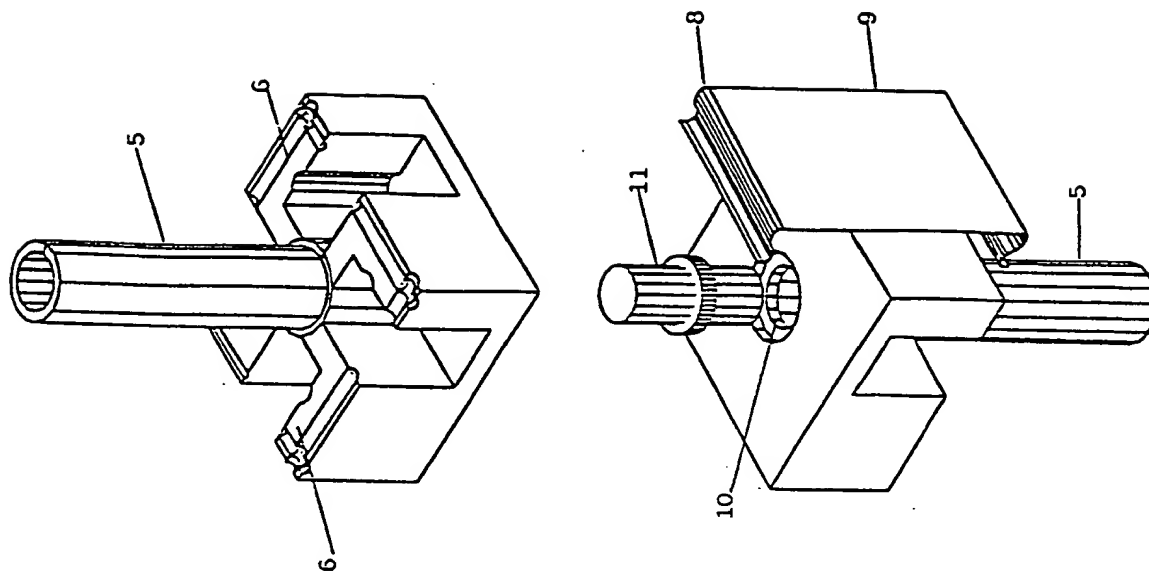


FIG. 5

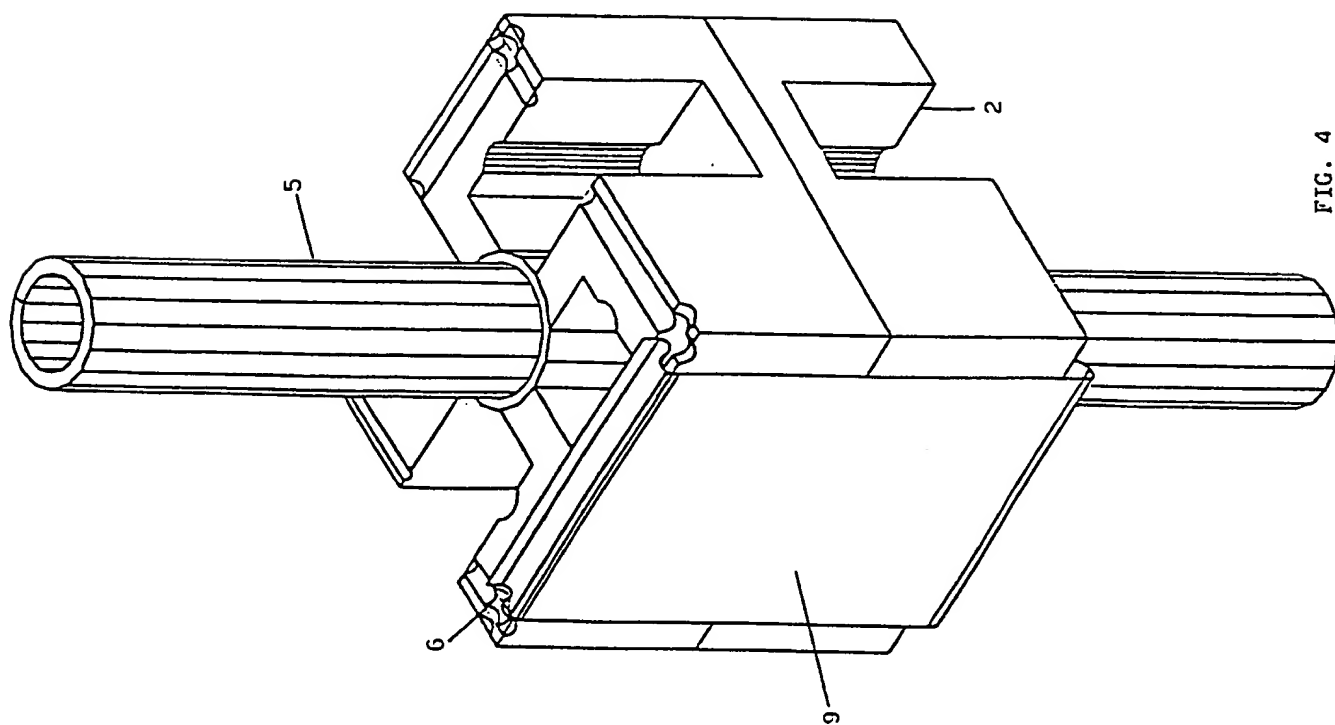


FIG. 4

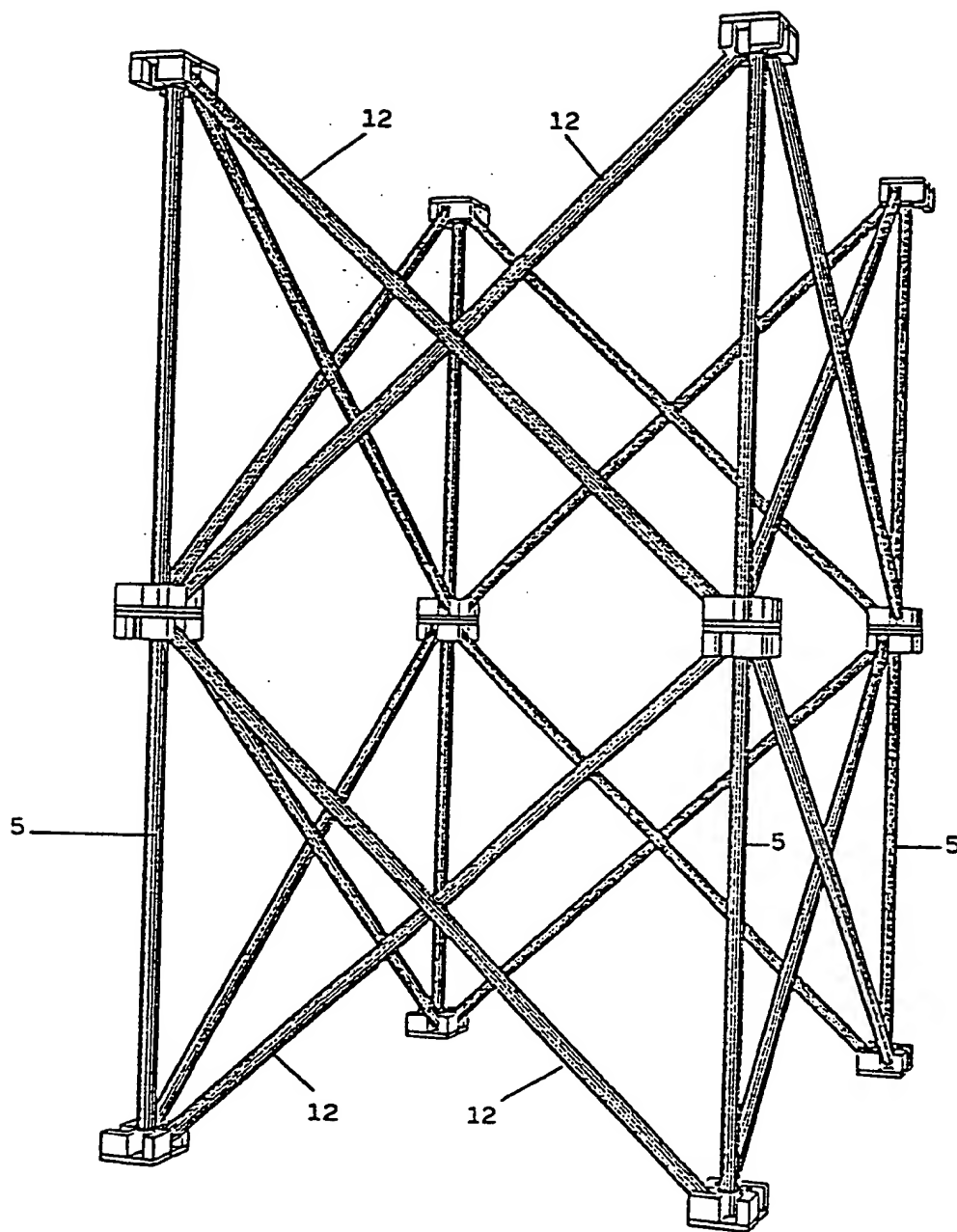


FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 00/00053

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04B1/344 E04H1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04B E04H A47F G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 123 550 A (NODSKOV ET AL.) 23 June 1992 (1992-06-23)	1,3-5,8
A	column 2, line 62 -column 4, line 4; figures	6
A	EP 0 219 201 A (SILK CUT FLOWERS LIMITED) 22 April 1987 (1987-04-22) page 3, line 5 -page 5, line 5; figures 1-4	1,2,8,9
A	EP 0 271 088 A (WICHMAN) 15 June 1988 (1988-06-15) column 3, line 15 -column 5, line 39; figures 1-6	1,8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

16 May 2000

Date of mailing of the international search report

23/05/2000

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IT 00/00053

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